PSEG Nuclear LLC
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PSEG
Nuclear LLC

MAR 31 2014

LR-N14-0081

10 CFR 50.73

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

LER 311/2014-002-00
Salem Nuclear Generating Station Unit 2
Renewed Facility Operating License No. DPR-75
NRC Docket No. 50-311

SUBJECT: Manual Reactor Trip Due to a Partially Dropped Rod

The Licensee Event Report, "Manual Reactor Trip Due to a Partially Dropped Rod," is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A), as an "...event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)..."

The attached LER contains no commitments. Should you have any questions or comments regarding the submittal, please contact David Lafleur of Salem Regulatory Assurance at 856-339-1754.

Sincerely,

FOR J. PERRY
L. MASKER

John F. Perry
Site Vice President – Salem

Attachments (1)

cc Mr. W. Dean, Administrator – Region 1, NRC
Mr. John Hughey, Licensing Project Manager – Salem, NRC
Mr. P. Finney, USNRC Senior Resident Inspector, Salem (X24)
Mr. P. Mulligan, Manager IV, NJBNE
Mr. T. Joyce, President and Chief Nuclear Officer – Nuclear
Mr. T. Cachaza, Salem Commitment Tracking Coordinator
Mr. L. Marabella, Corporate Commitment Tracking Coordinator
Mr. D. Lafleur, Salem Regulatory Assurance

NRC FORM 366 (01-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Salem Generating Station – Unit 2	05000311	1 OF 4

4. TITLE Manual Reactor Trip Due to a Partially Dropped Rod

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
01	31	2014	2014	- 002	- 00	03	31	2014	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
10. POWER LEVEL	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
100%	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMER *(Include Area Code)*
David Lafleur, Senior Compliance Engineer, Salem Regulatory Assurance	(856) 339-1754

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	AA	CBL	W120	Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On January 31, 2014 at 0805, Salem Unit 2 experienced a partially dropped rod, identified as Control Bank D, Group B, Rod 1D2, while performing monthly rod surveillance testing. Rod 1D2 indicated 166 steps with the remainder of Control Bank D, Group B rods at 220 steps withdrawn. Operators entered Technical Specification (TS) 3.1.3.1, Action c. for the misaligned control rod, requiring a reduction in thermal power to less than 75 percent Rated Thermal Power (RTP) within one hour. A load reduction using boration and turbine load adjustments was commenced at 0812.

At 0904, at approximately 70 percent RTP, the plant entered the Action for TS 3.1.1.1, Shutdown Margin (SDM), which requires a continuous boration rate of equal to or greater than 33 gpm until the required SDM is restored. At approximately 20% RTP, the reactor was manually tripped due to a lack of available turbine load to continue to maintain Tave on program. All control rods inserted on the reactor trip. Corrective actions will be based on the cause of the rod 1D2 cable failure and possible enhancements to the SDM calculation procedure.

This report is being made in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an "...event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)..."

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

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1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Salem Generating Station – Unit 2	05000311	2014	- 002	- 00	2 OF 4

NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

Westinghouse – Pressurized Water Reactor (PWR/4)

Control Rod Drive System/Rod {AA/ROD}

Energy Industry Identification System {EIIS} codes and component function identifier codes appear as {SS/CCC}

IDENTIFICATION OF OCCURRENCE

Event Date: January 31, 2014

Discovery Date: January 31, 2014

CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 2 was in Operational Mode 1, operating at 100 percent RTP. No additional structures, systems or components were inoperable at the time of the discovery that contributed to the event.

DESCRIPTION OF OCCURRENCE

On January 31, 2014 at 0745, Salem Unit 2 commenced its monthly rod control surveillance testing. At 0805, while inserting Control Bank D rods 15 steps, operators received alarms and indications of a misaligned rod. Operators diagnosed the condition to be a partially dropped rod identified as Control Bank D, Group B, Rod 1D2 {AA/ROD}. Rod 1D2 indicated 166 steps with the remainder of the Control Bank D, Group B rods at 220 steps withdrawn.

Operators entered TSAS 3.1.3.1, Action c. for the misaligned control rod 1D2. TS 3.1.3.1, Action c.3.d) requires that with control rod 1D2 misaligned greater than 12 steps above 85 percent RTP, power operations may continue if RTP is reduced to less than or equal to 75 percent RTP within one hour. Operators also entered TS Action Statement (TSAS) 3.2.4, Action a. for Quadrant Power Tilt Ratio (QPTR) greater than 1.02 percent. With a QPTR of greater than 1.02 percent and less than 1.09 percent, operators are required to either reduce the QPTR to within its limit or reduce thermal power at least 3 percent for each 1 percent of indicated QPTR in excess of 1.0.

At 0807, operators entered the dropped rod response procedure and commenced a power reduction to 70 percent RTP at 0812. By procedure, the load reduction was performed by boration and turbine

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Salem Generating Station – Unit 2	05000311	2014	- 002	- 00	3 OF 4

NARRATIVE

load adjustments. The control room supervisor directed Reactor Engineering to perform the SDM calculation in accordance with TS 3.1.1.1.

At 0848, operators entered TSAS 3.2.1, Action a. for Axial Flux Difference (AFD) outside the target band. TS 3.2.1, Action a.2.a) allows power to continue when operating between 50 and 90 percent RTP provided that the indicated AFD has not been outside the target band for more than 1 hour cumulative during the previous 24 hours, and AFD is within limits.

At 0856, reactor power was reduced to less than 75 percent RTP.

At 0904, SDM was determined to be less than 1.3 percent delta k/k. TSAS 3.1.1.1 requires an immediate initiation of boration at equal to or greater than 33 gpm until required SDM is restored. Reactor Engineering informed Operations that an RCS boron concentration of 468 ppm would be required to meet the SDM requirement. At 0911, Operators commenced boration at a rate of 33 gpm.

At 0936, reactor power was decreased to less than 50 percent RTP. Operators continued to reduce load for temperature control. TS 3.1.1.1 required SDM had not yet been verified and boration continued.

At 1001, at approximately 20 percent RTP, as Tave approached 543 degrees Fahrenheit, the reactor was manually tripped. All control rods including rod 1D2 inserted on the reactor trip. All systems functioned as expected.

At 1004, boration was discontinued. At 1012, Chemistry reported an RCS boron concentration of 520 ppm. TS 3.1.1.1 was exited as SDM requirements were met.

At 1037, operators transitioned from emergency to normal operating procedures, maintaining Operational Mode 3, Hot Standby conditions.

At 1152, a 4 hr. notification was made to the NRC in accordance with the requirements of 10 CFR 50.72(b)(2)(iv)(B) for an unplanned manual reactor trip.

CAUSE OF OCCURRENCE

The cause of dropped rod 1D2 was attributed to a short to ground located in the rod 1D2 Movable Gripper Cable. Two blown fuses in the rod control solid state power cabinet were identified. Subsequent Electrical circuit testing of associated cables indicated a short to ground on the 600 volt power cable from the rod control containment cabinet to the reactor head.

The manual reactor trip was performed due to a lack of available turbine load to continue to maintain Tave on program. With turbine load at 20 percent, operators would have been challenged to continue to

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Salem Generating Station – Unit 2	05000311	2014	- 002	- 00	4 OF 4

NARRATIVE

maintain Tave on program using turbine load due to the continuous, rapid boration of 33 gpm needed to achieve required SDM with increasing xenon, and end of core life conditions.

PREVIOUS SIMILAR OCCURRENCES

A review of LERs at Salem Station dating back to 2011 identified no similar manual reactor trip events.

SAFETY CONSEQUENCES AND IMPLICATIONS

There were no safety consequences associated with this event. Operators appropriately responded to plant conditions to manually trip the reactor and shutdown the plant. All plant safety systems operated as required.

A review of this event determined that a Safety System Functional Failure (SSFF) as defined in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Performance Indicator Guideline, did not occur.

CORRECTIVE ACTIONS

1. The defective 1D2 Movable Gripper power cable and rod control solid state power cabinet fuses were replaced. Rod control surveillance testing was performed and rod 1D2 was returned to service.

2. Additional corrective actions will be determined based on the cause of the rod 1D2 cable failure and possible enhancements to the SDM calculation procedure.

COMMITMENTS

No commitments are made in this LER.